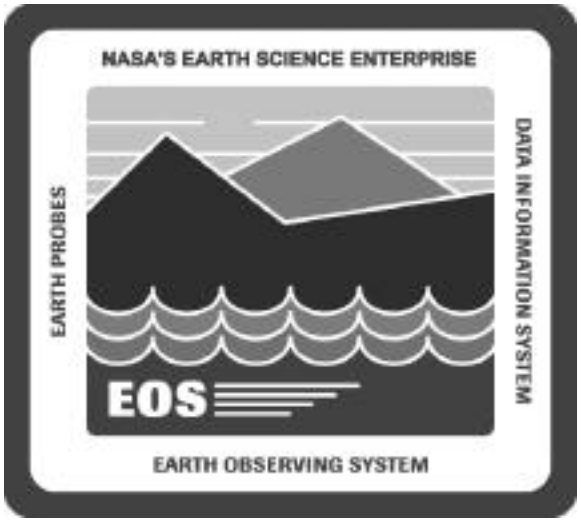


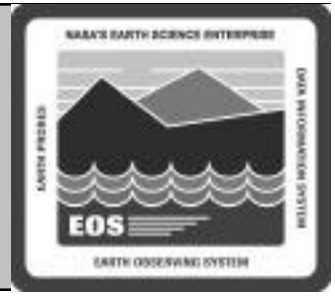
Landsat 7 Subsetting (Band And Floating Scene)

Alward Siyyid

Raytheon Raytheon Systems Company

704-CD-510-001

Requirements Summary

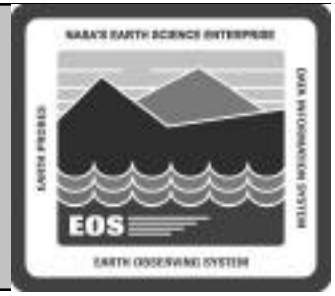


A floating scene is a full swath width, partial L70R sub-interval. It is called "floating" as it is not restricted by WRS convention of scene definition. A floating scene can be anything from 0.5 WRS scene to the whole of L70R swath.

L70R Floating Scene subsetting is supported by requirements in DSS, ESDT, and DM subsystems.

- **DM is required to provide price estimation for the L7 floating scene as defined by the user.**
- **DSS is required to support the susbsetting of floating scenes.**
- **ESDT/DLL is required to coordinate the whole acquisition process and is also responsible for conversion from HDFEOS format to HDF format.**

Key Design Drivers



DSS

- **An algorithm is required to define the region on the swath in terms of start scan and stop scan to accomplish subsetting. This is obtained from the LPSO.**

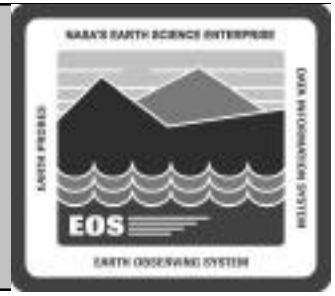
DM

- **Need to define a floating scene in terms of equivalent WRS scenes for price estimation.**

ESDT/DLL:

- **Reformatting code is required to be revamped to facilitate:**
  - **Multiple WRS scenes - reformatting is currently designed only to cater for fixed WRS scene.**
  - **Band Subsetting - selective acquisition of L7 bands and other non-image data.**
  - **Large file sizes - whole subinterval can be ordered as a floating scene amounting to 20GB of data for the whole 35 scenes.**
  - **Band8 segment handling - A floating scene may extend to more than one band8 segments. This needs to be appropriately subsetted and reformatted**

New SW Components



DSS

- New subsetting interface for the floating scenes.
- New algorithm to determine start and stop scans.
- New code to subset all the fields present

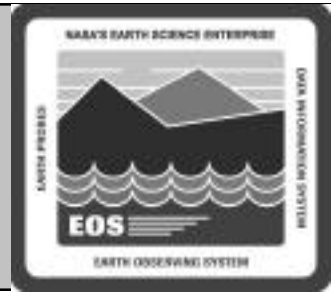
ESDT/DLL

- New Acquire functionality for L70R ESDT
- Band subsetting

Modifications to existing SW components

- Reformatting is revisited to cater for floating scenes - this involves :
  - Band 8 segment handling - A floating scene may cross over L7 band 8 file boundaries.
  - Band 8 segment handling - A floating scene may cross over L7 band 8 file boundaries.
  - Memory management for bigger datasets initially designed only for fixed WRS scenes
  - DMS
    - V0ECSGwy is modified to handle user floating scenes spatial and band criteria for price estimation and subsequent acquisition

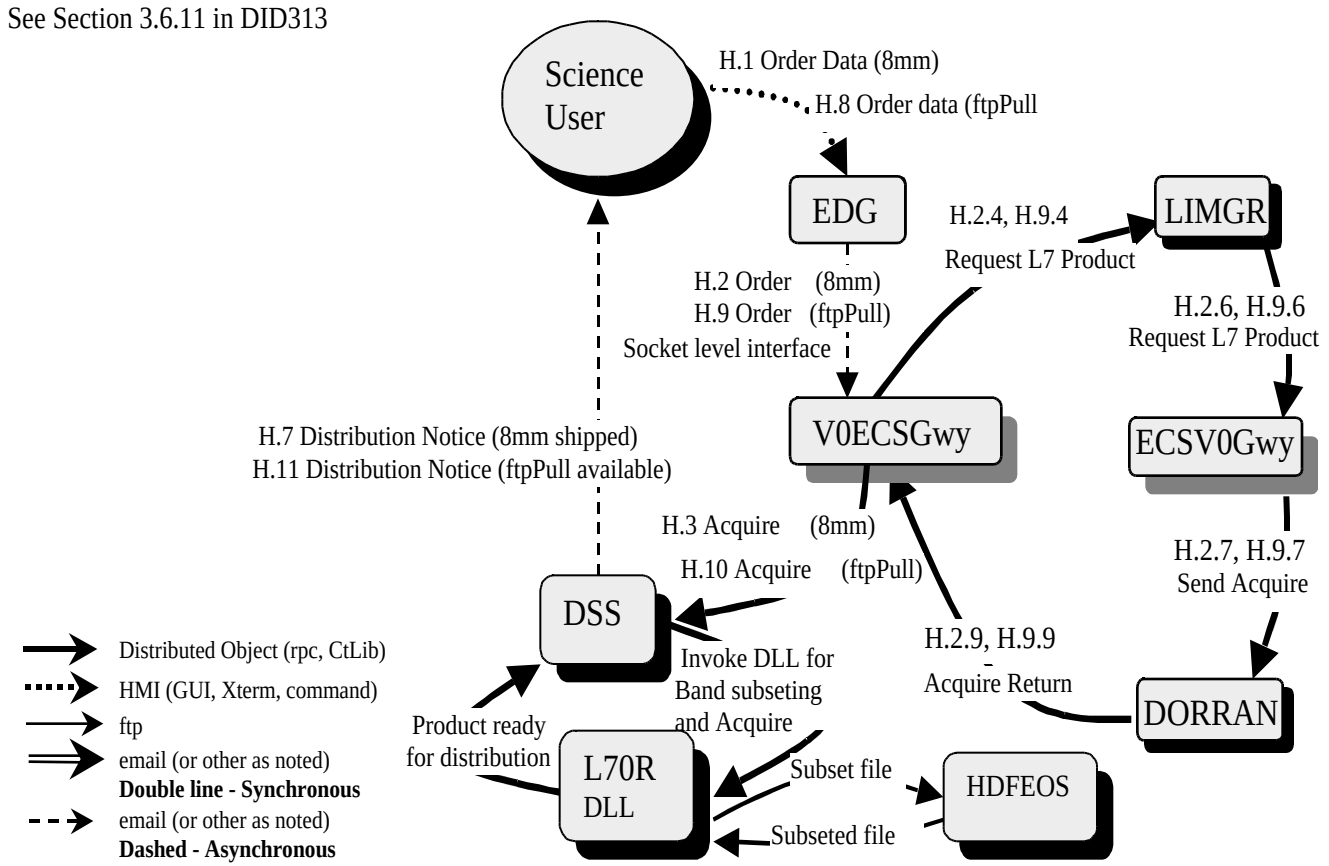
New HW Components



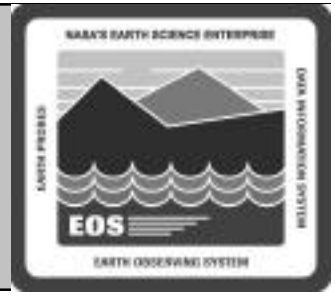
DSS

- **Staging Disk**
  - **Maximum size of a floating scene can be the whole subinterval. In order to facilitate this, disk space on eowkg01 (EDC DAAC) will be increased.**
  - **On HDF-EOS server machines, swap memory space will also be increased for large file processing.**
- **Distribution**
  - **Distribution will use the staging disk created by the DLL for the final product as its input directory.**

L7 ordering Floating Scenes Product Interaction Diagram



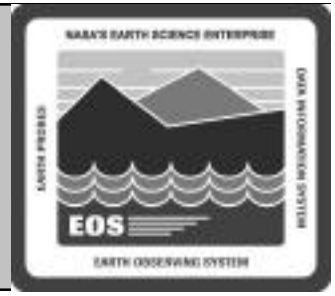
End User Interactions



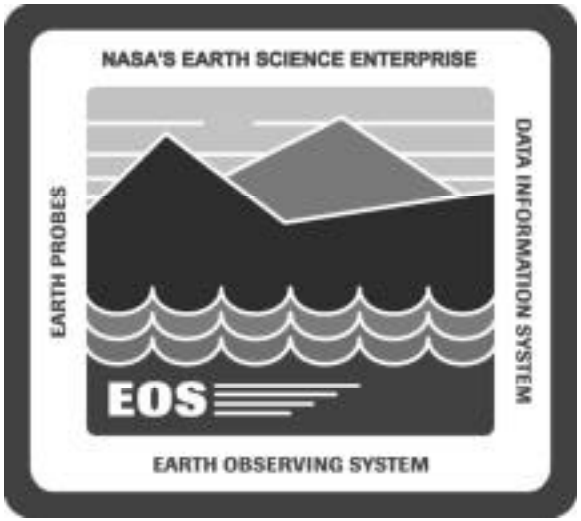
User Services

- **DM**
  - **End users will be able to submit a floating scene acquire request with spatial and band criteria for L70R granules**

DAAC Operations Interactions & Impacts



None



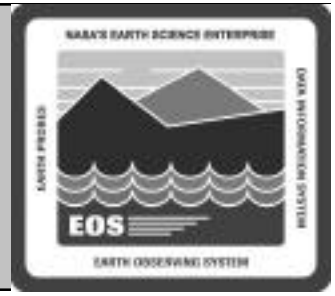
L7 Floating Scene Price Estimate

Guy Swope

Raytheon Raytheon Systems Company

704-CD-510-001

Requirements Summary

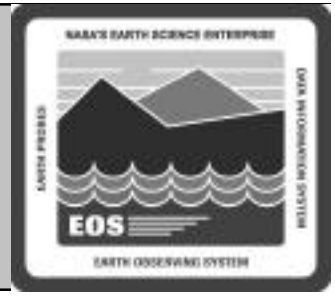


DMS subsystem's V0-ECS Gateway sends Landsat 7 Level 9R (L70R) subsetting options to EOS Data Gateway (EDG) client in inventory search results

V0-ECS Gateway will support L70R Price Estimate Requests

- **V0-ECS Gateway receives price estimate message for L70R floating scenes from EDG**
- **V0-ECS Gateway calculates price estimate for L70R floating scene (partial subinterval) using spatial, band subsetting parameters**
  - **Will follow original price estimate algorithm until new algorithm is CCR'd**
- **V0-ECS Gateway sends price estimate results message to EDG**

Key Design Drivers



Support L70R floating scene price estimates

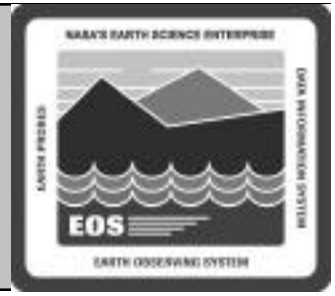
- Parameterized algorithm allows EDC DAAC to change price via table changes

User Interface:

- EDG client allows a user to determine price of subsetted Landsat subintervals by providing interface for users to select
  - spatial extent of Landsat 7 0R data needed
  - Landsat band files to be included in the distribution
- EDG client displays price estimate upon receiving price estimate result

NOTE: Landsat Level 1 price estimates to be handled by an EDC developed server

New HW/SW Components

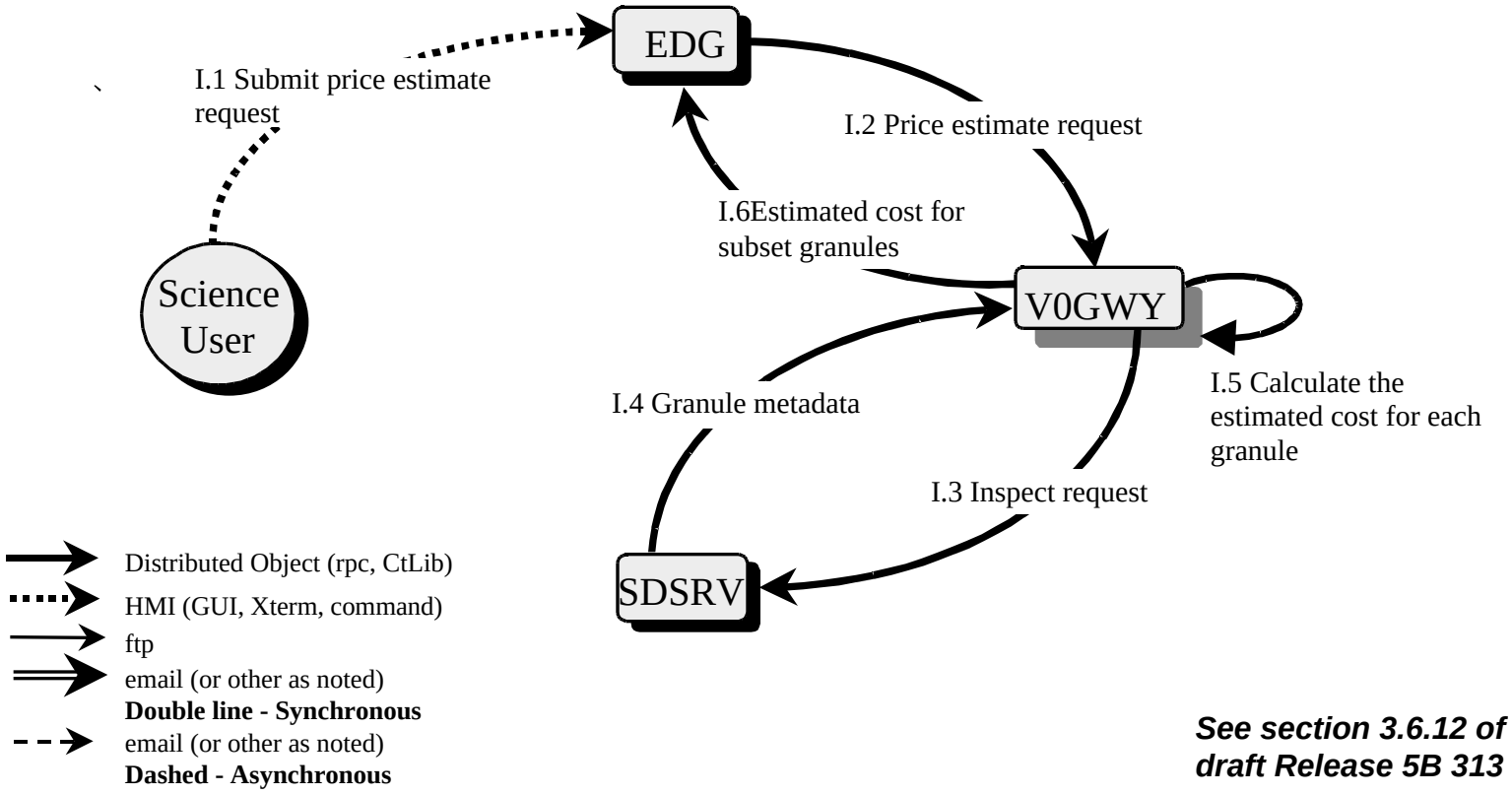


No new HW/SW Components

Modifications to existing SW components

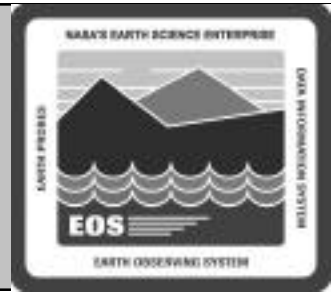
- V0-ECS Gateway extended in Data Management Subsystem
  - Extend inventory search results to include L70R subset options
  - Handle new Price Estimate Request and Result between EDG and V0-ECS Gateway
  - Implement scan line size and price estimate calculation algorithms
    - Includes additional inspect request of SDSRV to obtain subinterval spatial extent needed for scan line algorithm

L70R Floating Scenes Price Estimate Interaction Diagram



See section 3.6.12 of draft Release 5B 313

Operational Impacts



User Services

- End users will be able to submit a price estimate request with spatial and band file subsetting for L70R granules

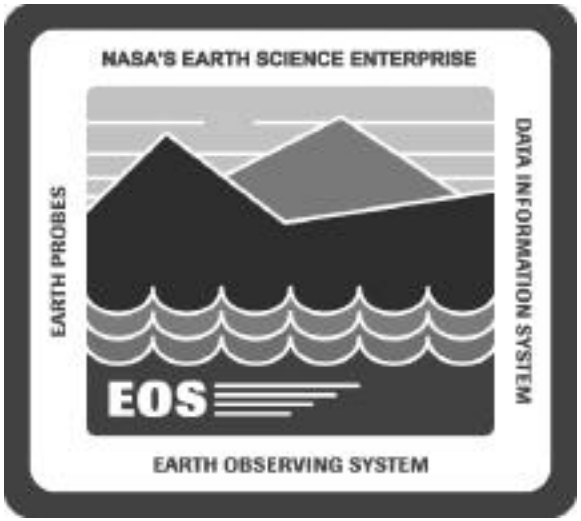
Configuration Parameters

- Price parameters for band and start/stop scan lines
- Maximum number of scenes per media

Parameterized Price Calculation Lookup Table Example

Scan_Line_Start	Scan_Line_Stop	Price(L0R)
0	385	$A
386	485	$B
486	585	$C
586	685	$D
686	785	$E
...	...	...

Number_of_Band (Not selected)	Price_Difference
8	-$F
7	-$G
6H	-$H
6L	-$I
5	-$J
4	-$K
3	-$L
2	-$M
1	-$N



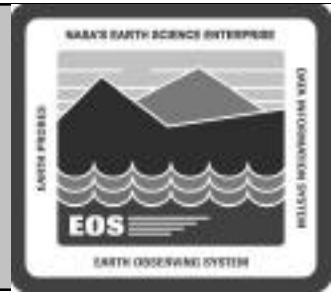
ECS Core and PSAs

Julian Chang

Raytheon Raytheon Systems Company

704-CD-510-001

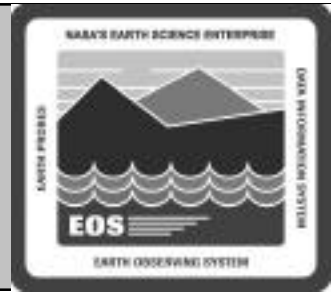
Requirements Summary



Two New ECS Core and PSA Capabilities shall be added:

- **Export of ECS Core and PSA Valids:**
  - **Data Management Subsystems' Maintenance Tool shall be modified to support export of ECS Core and Product Specific Attribute (PSA) valids and their corresponding values to V0 IMS system**
- **Acceptance of ECS Core and PSA in a search request:**
  - **Data Management Subsystem's Version 0 Gateway shall accept list of ECS Core Attributes and/or Product Specific Attributes as search criteria in an Inventory Search Request**
  - **The V0 Gateway shall return granule-level attributes and their values as part of an Inventory Search Results to the Version 0 Client**

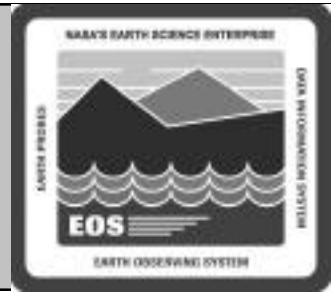
Design Changes - Key Drivers



User Interface

- Existing Export Valids File MTool Operator Interface will be used:
  - The Valids File containing the association between a collection and its attribute will be automatically generated by the Mtool
  - The External Attribute Definitions File containing the detailed attribute definitions will be manually generated by the DAAC Operator
- Existing ECS-V0 interface protocol will be used to support the addition ECS Core & PSA search request

Hardware/Software Changes

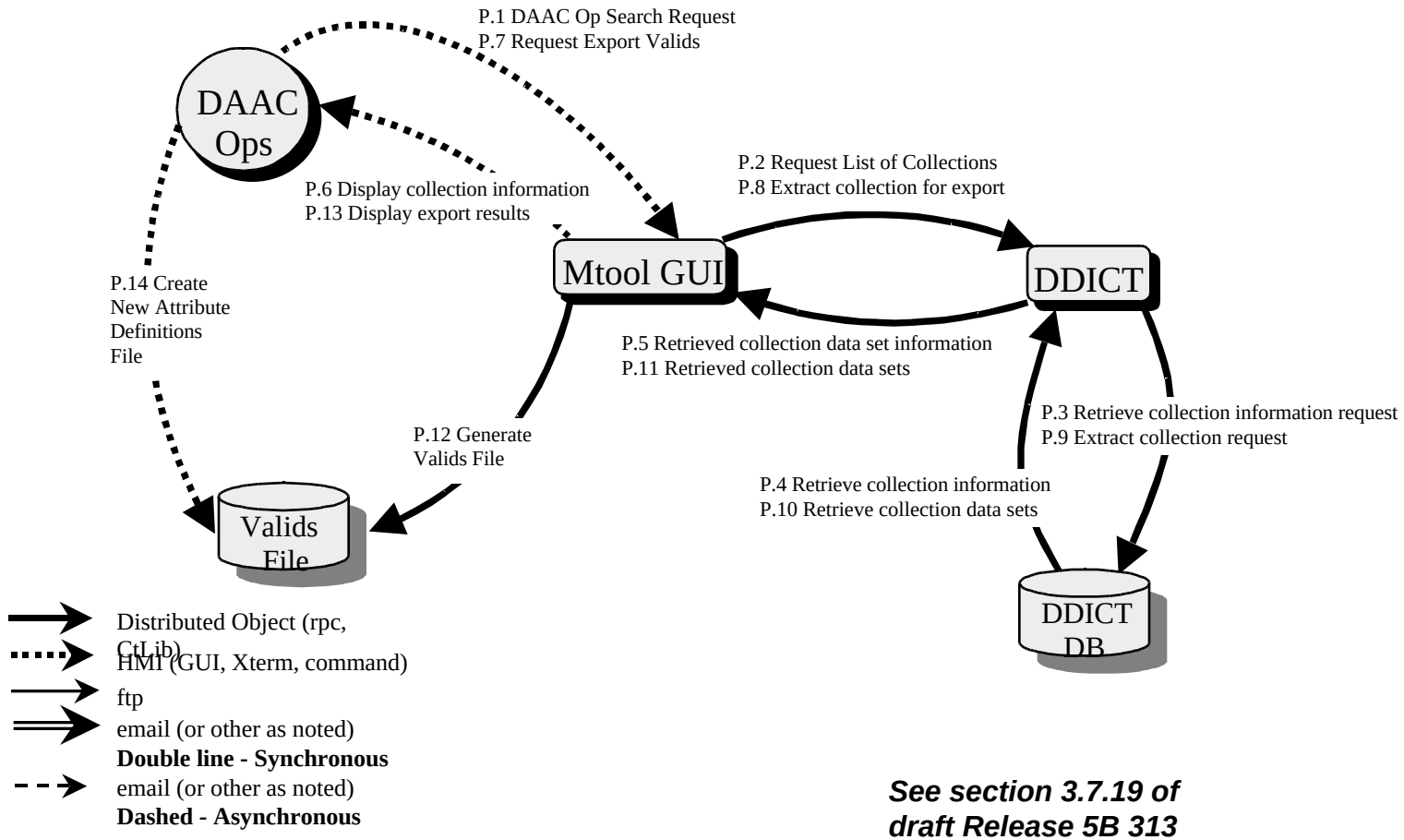


No new HW/SW components

Modifications to existing software

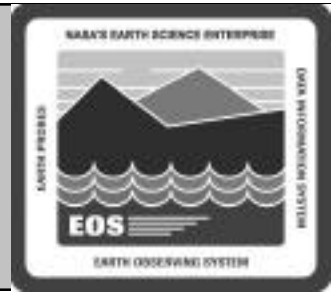
- **Data Dictionary Maintenance Tool**
- **V0-ECS Gateway**

ECS Core & PSA - Export Valids Interaction Diagram



See section 3.7.19 of draft Release 5B 313

Operational Impacts



DAAC Operators

- Generation of External Attributes Definition files
  - Performed when new ECS Core & PSAs are added to system
- File sent to V0 IMS for incorporation into existing set

Sample Valids File

```
GROUP = VALIDS
  DATA_CENTER_ID = “ECS_EDC”
  GROUP = DATASET
    DATASET_ID = “Landsat-7 Level-0R WRS-Scene V001”
    SOURCE = (“”)
    SENSOR = (“ETM+”)
    PARAMETER = (“Infared Imagery”, “Land Cover”, “Visible Imagery”)
    PROCESSING_LEVEL = “0”
    GROUP = DATASET_COVERAGE
      SPATIAL = “90.00000000000000 N,, -90.00000000000000 S,,
                 180.00000000000000 E,, -180.00000000000000 W”
      TEMPORAL = “05/01/98 04:00:00 - 08/06/98 02:00:00”
    END_GROUP = DATASET_COVERAGE
    GROUP = GRANULE_COVERAGE
      SPATIAL = “”
      TEMPORAL = “”
    END_GROUP = GRANULE_COVERAGE
    MD_ENTRY_ID = “L70RWRS1”
    GROUP = BROWSE
      FTP = “yes”
      INTEGRATED = “yes”
    END_GROUP = BROWSE
    FTP_PRODUCT_AVAILABLE = “yes”
    EXTENDED_CRITERIA_AVAIL =
      (“QA_LL_QUAD_CCA”, “QA_LR_QUAD_CCA”, “QA_UL_QUAD_CCA”,
       “QA_UR_QUAD_CCA”, “QA_SCENE_CCA”, “BAND1_GAIN”,
       “BAND2_GAIN”, “BAND3_GAIN”, “BAND4_GAIN”, “BAND5_GAIN”,
       “BAND6_GAIN_F1”, “BAND6_GAIN_F2”, “BAND7_GAIN”,
       “BAND8_GAIN”, QA_BAND1_GAIN”, “QA_BAND2_GAIN”,
       “QA_BAND3_GAIN”, “QA_BAND4_GAIN”, “QA_BAND5_GAIN”,
       “QA_BAND6_GAIN_F1”, “QA_BAND6_GAIN_F2”, “QA_BAND7_GAIN”,
       “QA_BAND8_GAIN”, QA_SCENE_QUALITY”, “SUN_AZIMUTH_ANGLE”,
       “SUN_ELEVATION_ANGLE”,  .  .  .

)
    END_GROUP = DATASET
END_GROUP = VALIDS
END
```

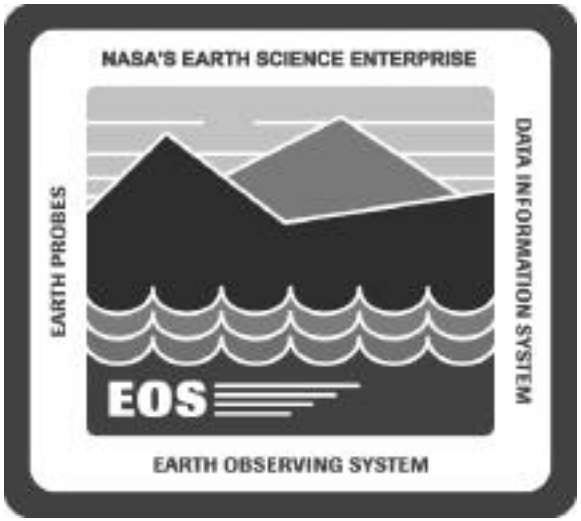
Sample External Attributes Definitions Files DAAC Supplied / V0 Modified

DAAC Supplied

```
GROUP = SPECIALIZED_CRITERIA
    CATEGORY_NAME = "BAND3_GAIN"
    VARIANT = "BAND3_GAIN"
    CRITERIA_NAME = "BAND3_GAIN"
    CRITERIA_TYPE = "STRING"
    CRITERIA_VALUE = ("H","L")
    COMMENT = "Band3 gain state for this product."
END_GROUP = SPECIALIZED_CRITERIA

GROUP = SPECIALIZED_CRITERIA
    CATEGORY_NAME = "BAND4_GAIN"
    VARIANT = "BAND4_GAIN"
    CRITERIA_NAME = "BAND4_GAIN"
    CRITERIA_TYPE = "STRING"
    CRITERIA_VALUE = ("H","L")
    COMMENT = "Band4 gain state for this product."
END_GROUP = SPECIALIZED_CRITERIA

GROUP = SPECIALIZED_CRITERIA
    CATEGORY_NAME = "SUN_ELEVATION_ANGLE"
    VARIANT = "SUN_ELEVATION_ANGLE"
    CRITERIA_NAME = "SUN_ELEVATION_ANGLE"
    CRITERIA_TYPE = "REAL"
    RANGE = Y
    CRITERIA_MIN = -90.0
    CRITERIA_MAX = 90.0
    COMMENT = "Sun elevation angle at true center of this WRS scene."
END_GROUP = SPECIALIZED_CRITERIA
```

V0 Modified

```
GROUP = SPECIALIZED_CRITERIA
    CATEGORY_NAME = "Landsat 7 Band Gains"
    VARIANT = "BAND3_GAIN"
    CRITERIA_NAME = "BAND3_GAIN"
    CRITERIA_TYPE = "STRING"
    CRITERIA_VALUE = ("H","L")
    SELECT_NUM = ONE
    COMMENT = ("Band3 gain state for this product.")
END_GROUP = SPECIALIZED_CRITERIA

GROUP = SPECIALIZED_CRITERIA
    CATEGORY_NAME = "Landsat 7 Band Gains"
    VARIANT = "BAND4_GAIN"
    CRITERIA_NAME = "BAND4_GAIN"
    CRITERIA_TYPE = "STRING"
    CRITERIA_VALUE = ("H","L")
    SELECT_NUM = ONE
    COMMENT = ("Band4 gain state for this product.")
END_GROUP = SPECIALIZED_CRITERIA

GROUP = SPECIALIZED_CRITERIA
    CATEGORY_NAME = "Landsat 7 Sun Angles"
    VARIANT = "SUN_ELEVATION_ANGLE"
    CRITERIA_NAME = "SUN_ELEVATION_ANGLE"
    CRITERIA_TYPE = "REAL"
    RANGE = Y
    CRITERIA_MIN = "-90.0"
    CRITERIA_MAX = 90.0
    COMMENT = ("Sun elevation angle at true center of this WRS scene.")
END_GROUP = SPECIALIZED_CRITERIA
```

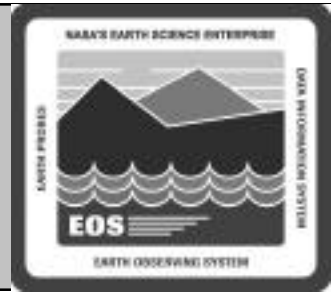


Production Rules

Mike Mauthe

Raytheon Raytheon Systems Company

Requirements Summary



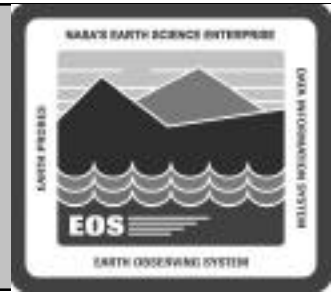
Allow Instrument Teams to define a pad to the Spatial Query Production Rule.

Be able to perform a search for the "Closest Granule" for a particular PGE's input in either the past (back in time) or the future (forward in time).

Be able to supply a PGE with the following in its PCF:

- **The data collection year**
- **The data collection month**
- **The data collection time**
- **The # of the granule within the orbit being processed**
- **The # of the orbit within the day being processed**

5B Production Rules Key Drivers



Spatial Pad

- Extension of Spatial Query
- Used for ASTER DEM

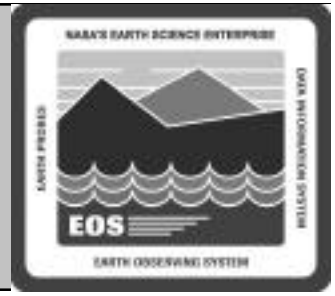
Closest Granule

- Extension of Most Recent Granule
- Used by MOPITT

Orbital Processing Runtime Parameters

- Builds off existing capability supporting Runtime Parameters
- Used by AIRS/PM-1

Hardware/Software Changes

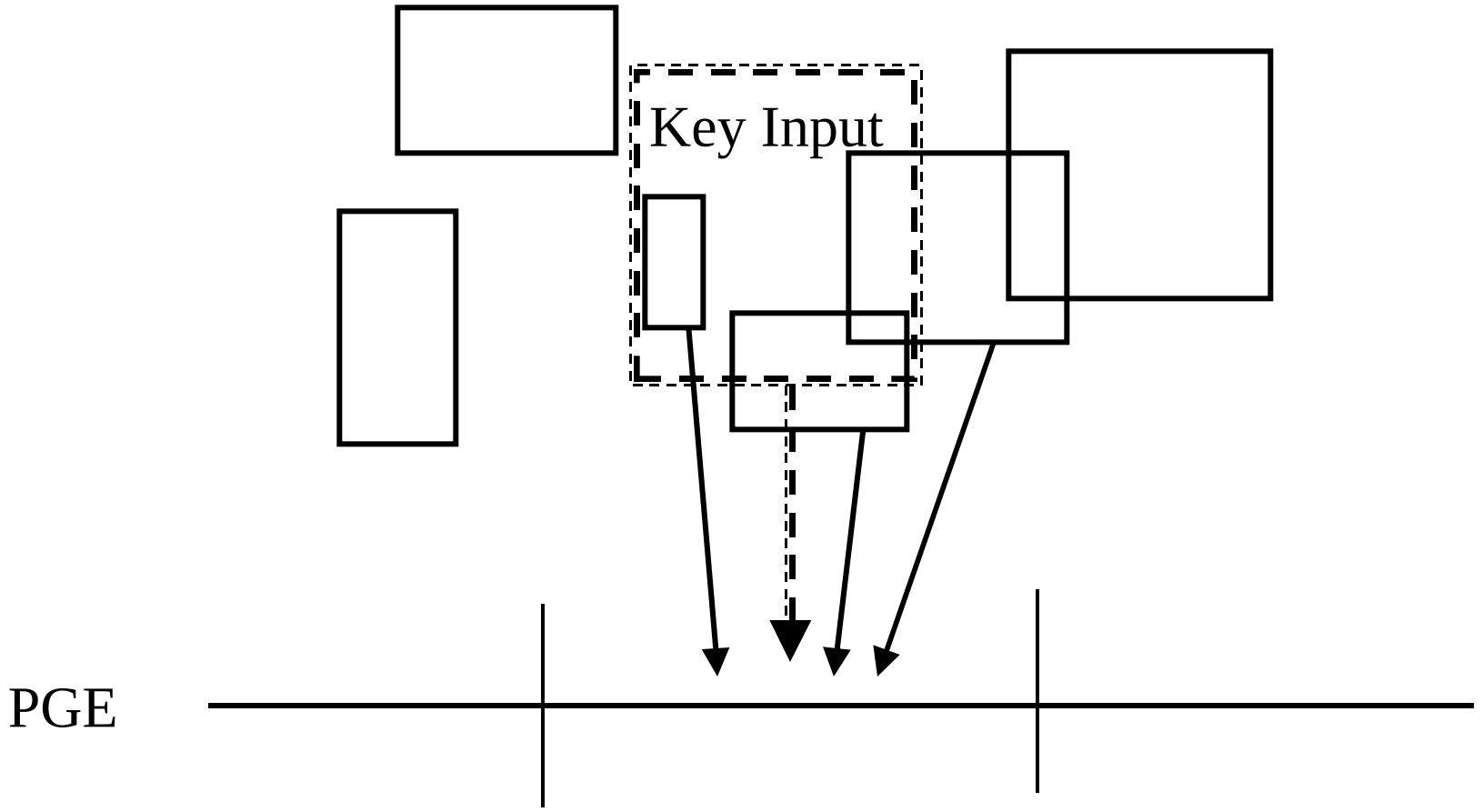


No new hardware is required for 5B production Rules

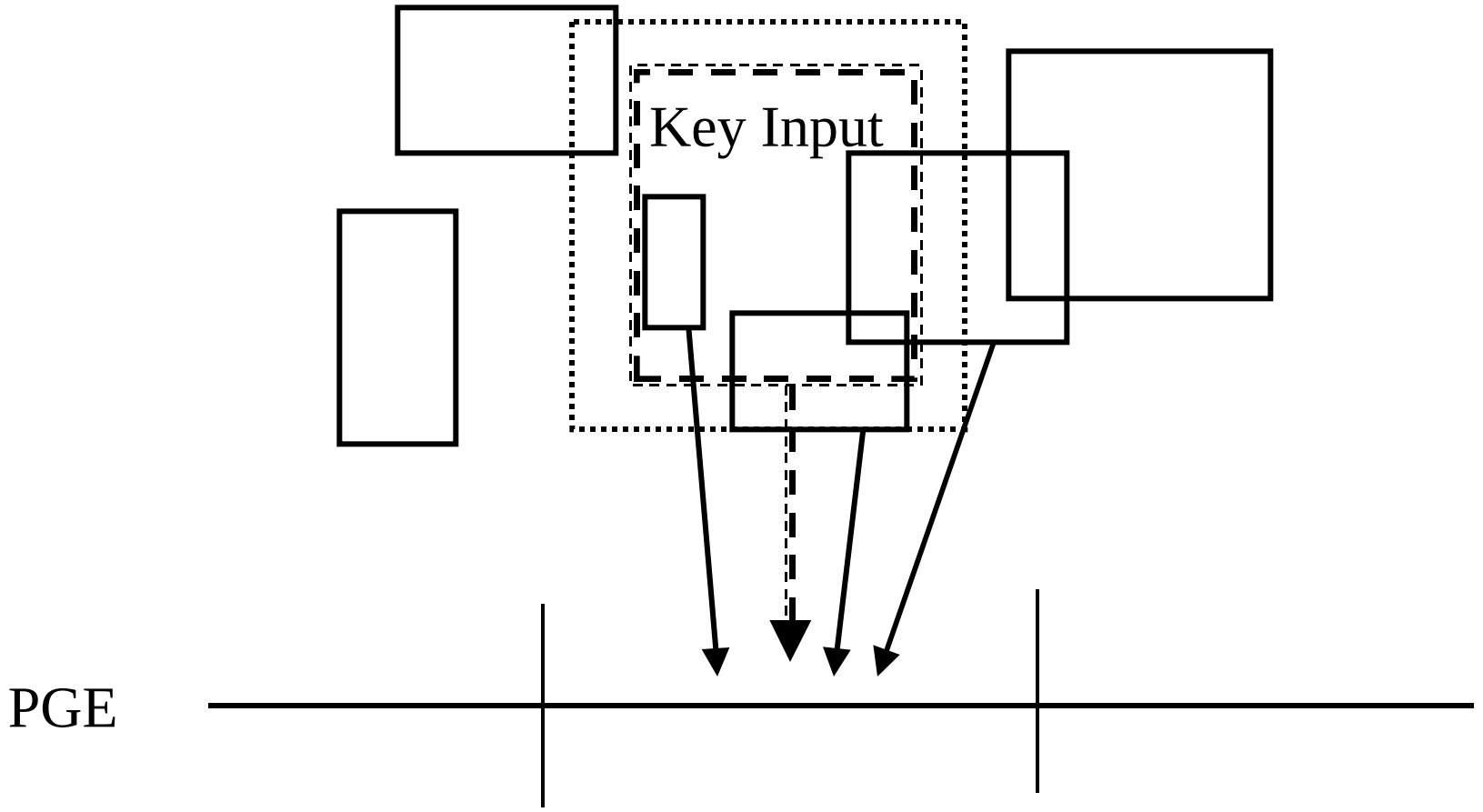
Software changes are contained within the Planning and Data Processing System (PDPS).

- **New parameters are required in the ODL that defines the PGE to PDPS.**
- **Production Request Editor has to read new Production Rule definitions and create the correct queries to Science Data Server.**
- **PRONG has to generate the the new information when creating the PCF using values from the PDPS database.**

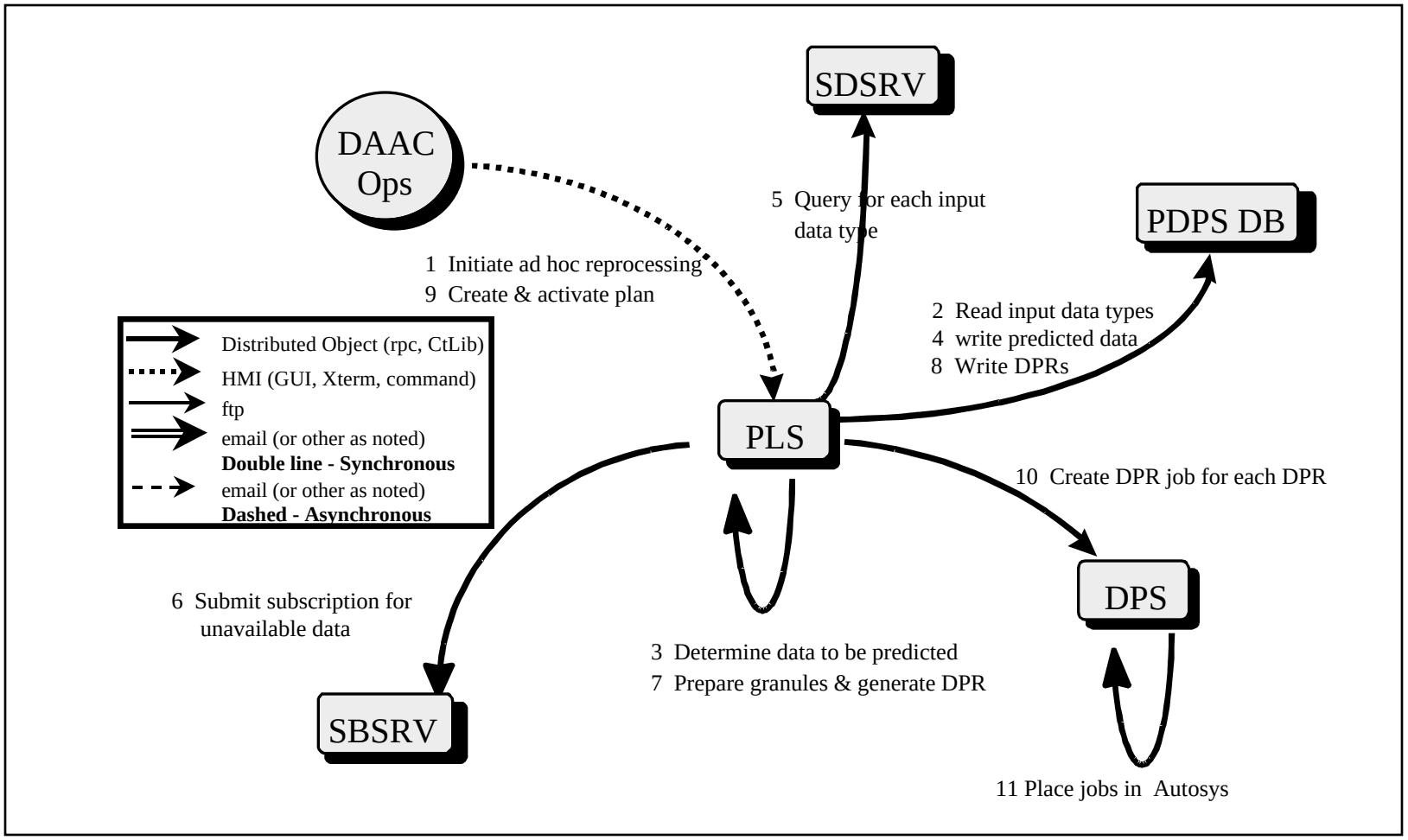
Spatial Query Diagram



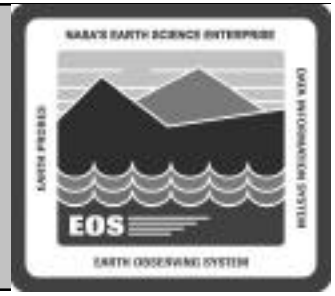
Spatial Pad Diagram



Spatial Query Interaction Diagram



Spatial Pad Details



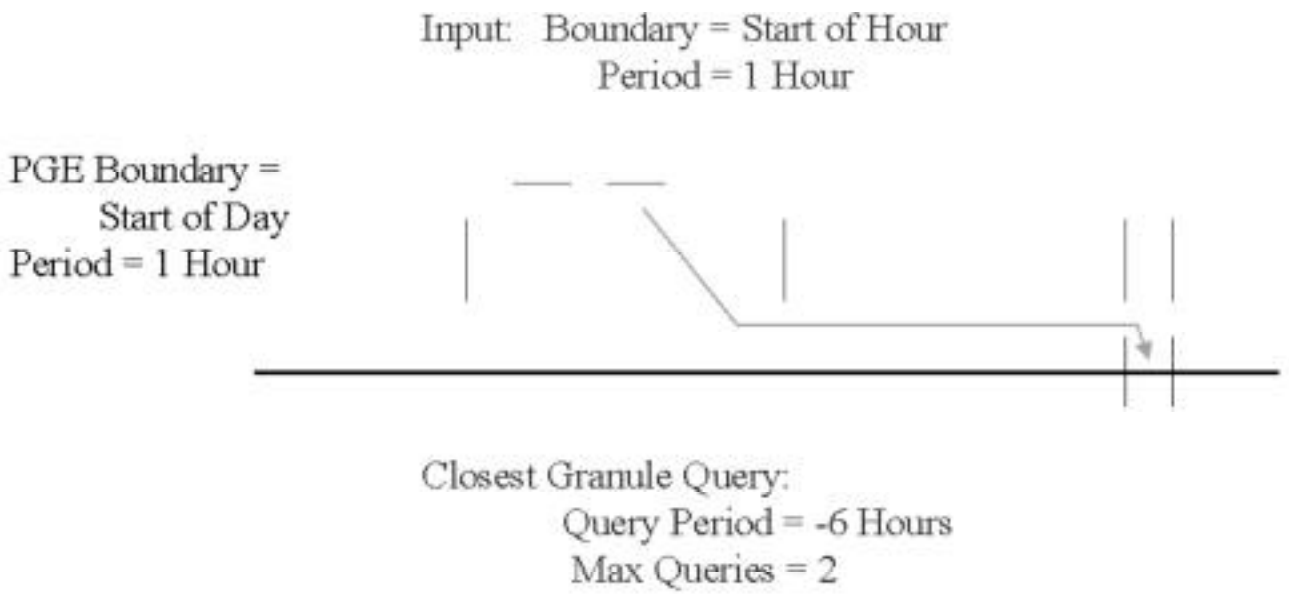
Spatial Pad is the Spatial Query Production Rule with a "buffer" added to the query.

At SSIT PGE ODLs define an input as being "Spatial" and define any Spatial Pad required.

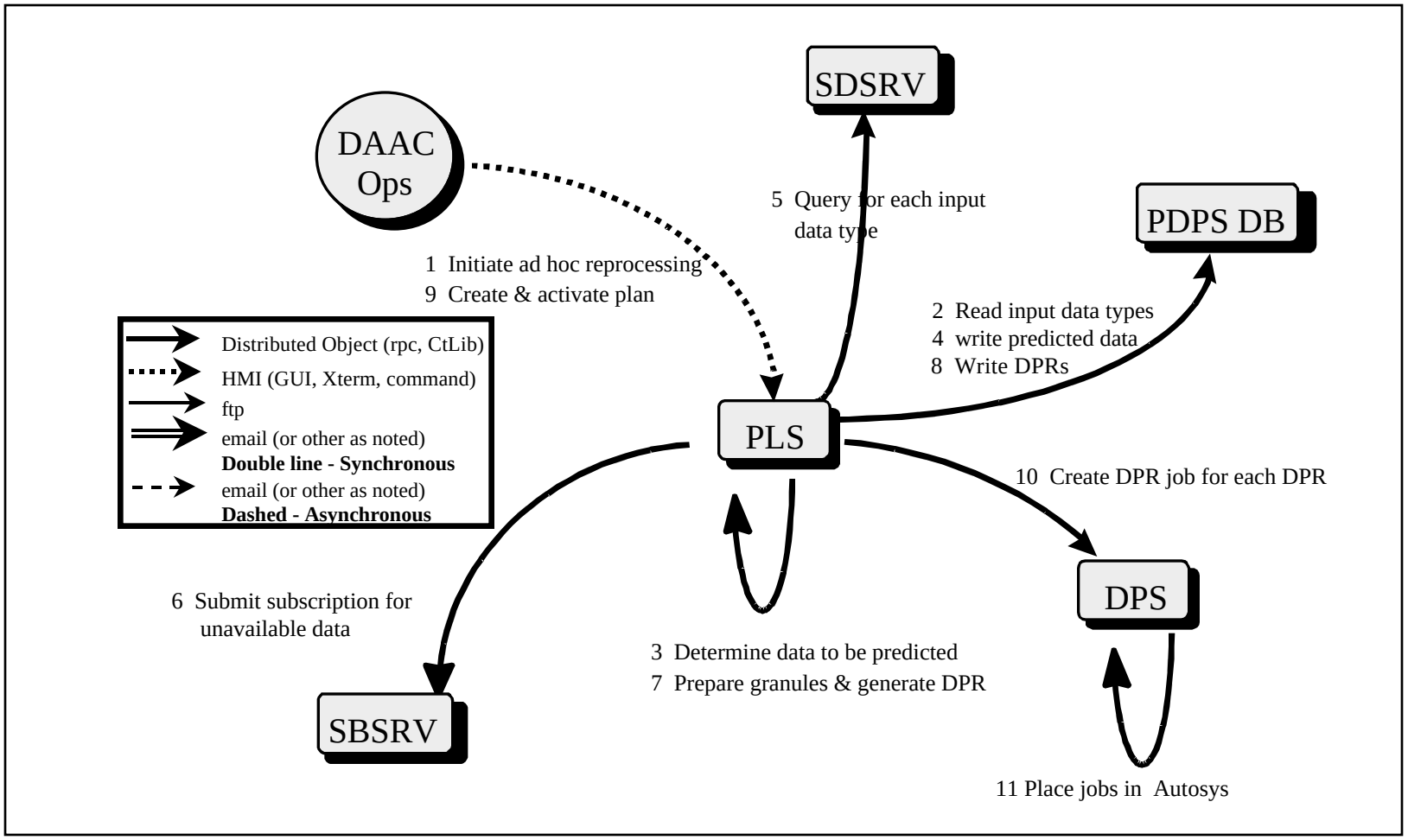
Production Request Editor adds the defined Spatial Pad to the Spatial Query for the PGEs input.

Any granules that intersect the padded area are linked as an input to that PGE.

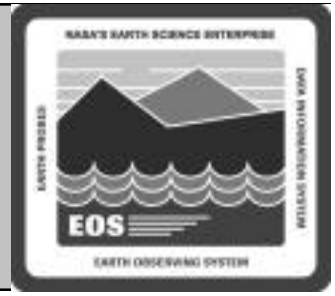
Closest Granule Diagram



Closest Granule Interaction Diagram



Closest Granule Details

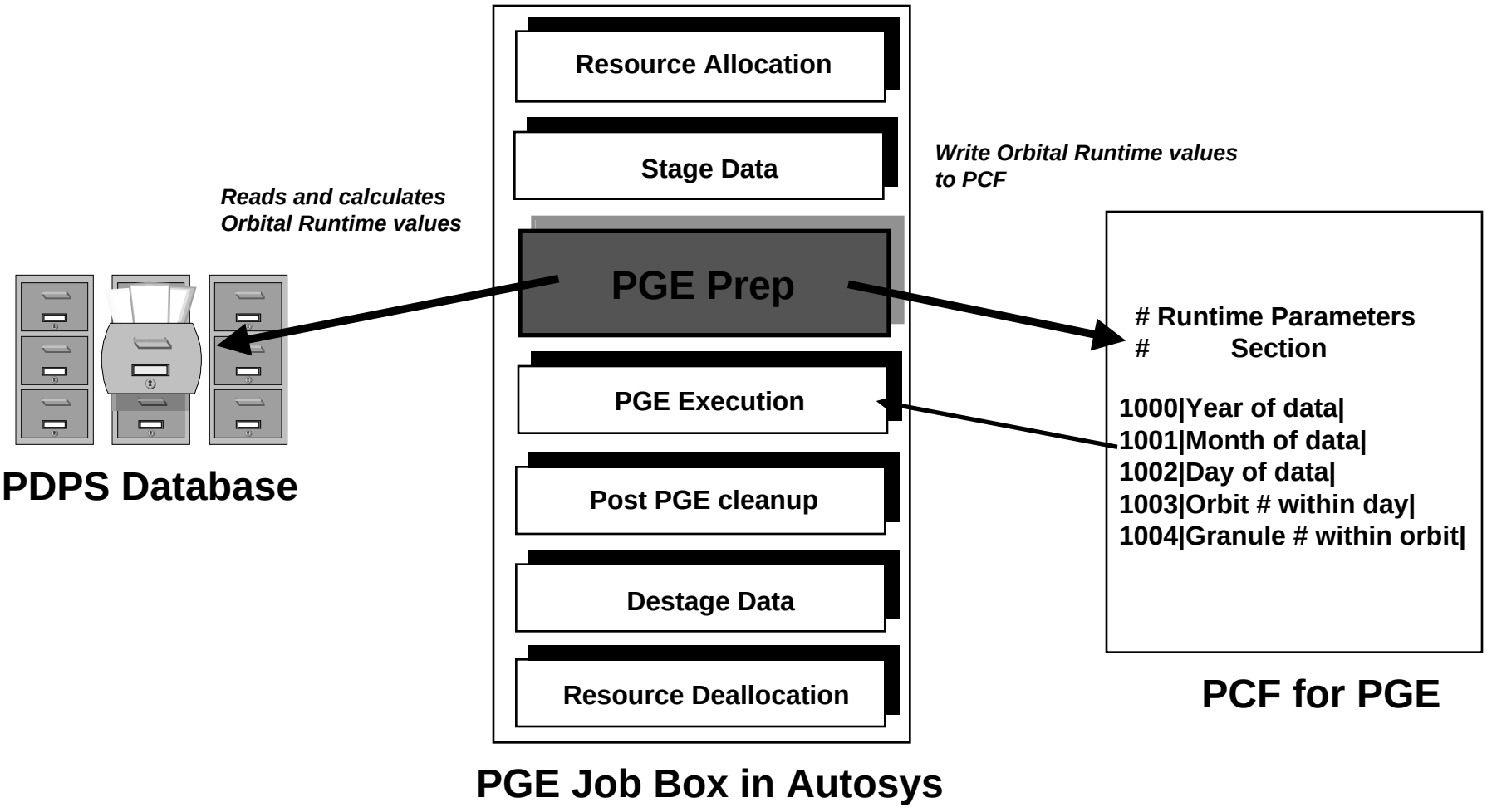


AT SSIT the PGE ODLs let PDPS know that a PGE needs a particular datatype that is “closest” to the PGE’s processing period.

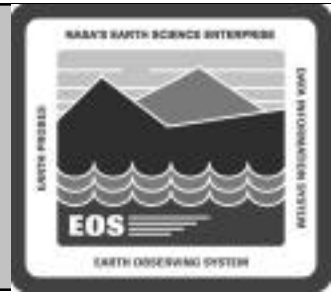
Production Request Editor finds the “closest” granule by repeatedly querying Science Data Server for that datatype shifting the query period either forward or backward each time.

If no input is found after all searches are done, the DPR fails.

Orbital Processing Runtime Parameters Diagram



Orbital Processing Runtime Parameters Details

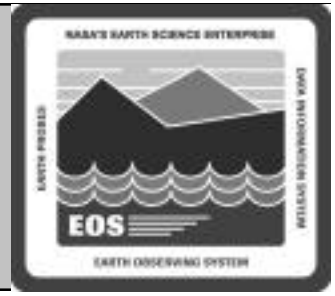


There are five runtime parameters that are provided to the PGE during its execution time:

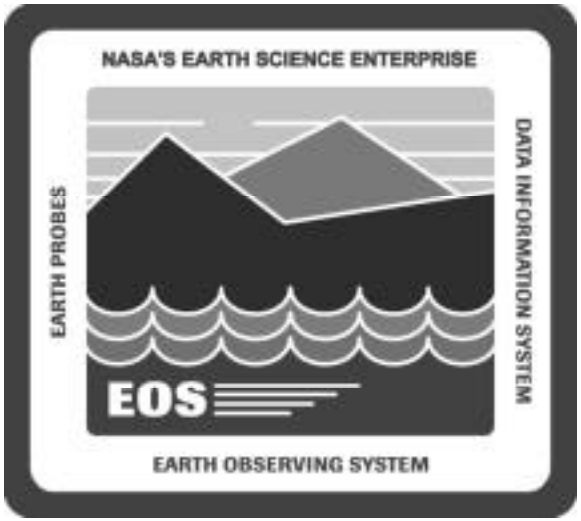
- **Orbit Number from the start of the day**
- **Granule Number from the beginning of the current orbit. AIRS granules will be of 6 min duration each.**
- **Year of the data collection time**
- **Month of the data collection time**
- **Day of the data collection time**

The values for the parameters are computed using PDPS's Orbit Model and made available to the PGE via Process Control File (PCF).

End User/Operations Interactions and Impacts



- **PGEs that desire to use the 5B Production Rules must be changed or coded such that they access any new PCF entries required (Orbital Processing Runtime Parameters only).**
- **All new Production Rules require new parameters in the ODL that defines a PGE to PDPS. These parameters are optional, and the SSIT staff is only required to add them if a particular PGE needs them.**
- **Production Request Editor may perform multiple queries when the Closest Granule Production Rule is required. The interval of each query and the number of queries should be set such that these queries do not cause DPR generation performance or Science Data Server performance to degrade.**

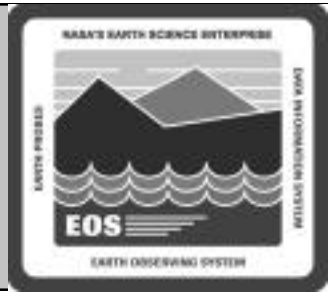


Update ESDT

Adrienne Dupree

Raytheon Raytheon Systems Company

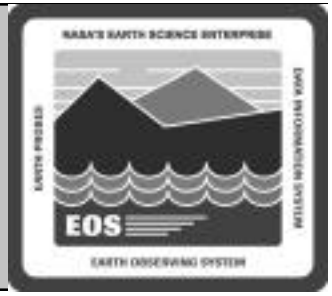
Requirements Summary



Update ESDT supported by requirements in SDSRV, CSS, IOS and DMS subsystems.

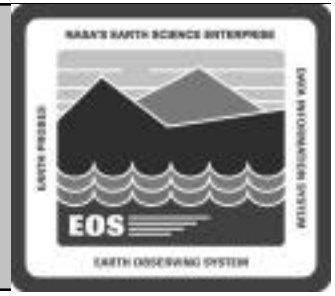
- **Add attributes, services, and events**
- **Update attributes and service signatures**

5P Requirements Summary



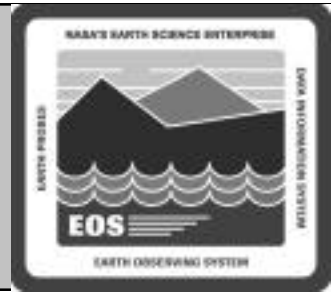
- **Add additional optional collection attributes in SDSRV, DDICT and ADSRV**
- **Add additional optional inventory attributes in SDSRV and DDICT**
- **Add new services in ADSRV**
- **Add new events in SDSRV and SBSRV**
- **Add new qualifiers to existing registered events in SBSRV**

5B Requirements Summary



- **Update collection attributes in SDSRV, DDICT, and ADSRV**
- **Update inventory attributes in SDSRV and DDICT**
- **Update service signatures in ADSRV**

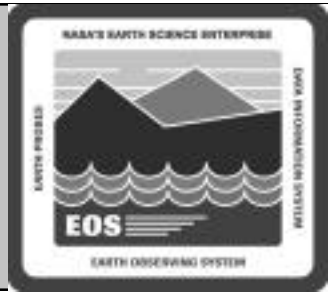
5B Requirements Summary



Attributes that are not updateable

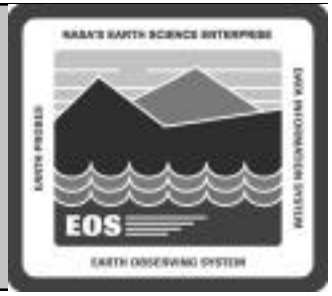
- **Short Name and VersionID in the CollectionDescriptionClass Group**
- **AdditionalAttributeName**
- **AdditionalAttributeType**
- **SensorCharacteristicName**
- **SensorCharacteristicType**
- **AnalysisShortName**
- **CampaignShortName**
- **InstrumentShortName**
- **PlatformShortName**
- **SensortShortName**

Key Design Drivers



- **Change ESDTs (i.e., add services, attributes, qualifiers, etc.) without deleting data and reinstalling ESDTs**
- **Preserve data without creating new version of ESDT**
- **Preserve existing subscriptions**
- **Allow for the retry of a failed ESDT Update**
- **Ensure that ESDTs that failed ESDT Update can not be used in other requests**
- **SDSRV only process ESDT Update requests in a special "maintenance" mode and reject all other requests**

New HW/SW Components

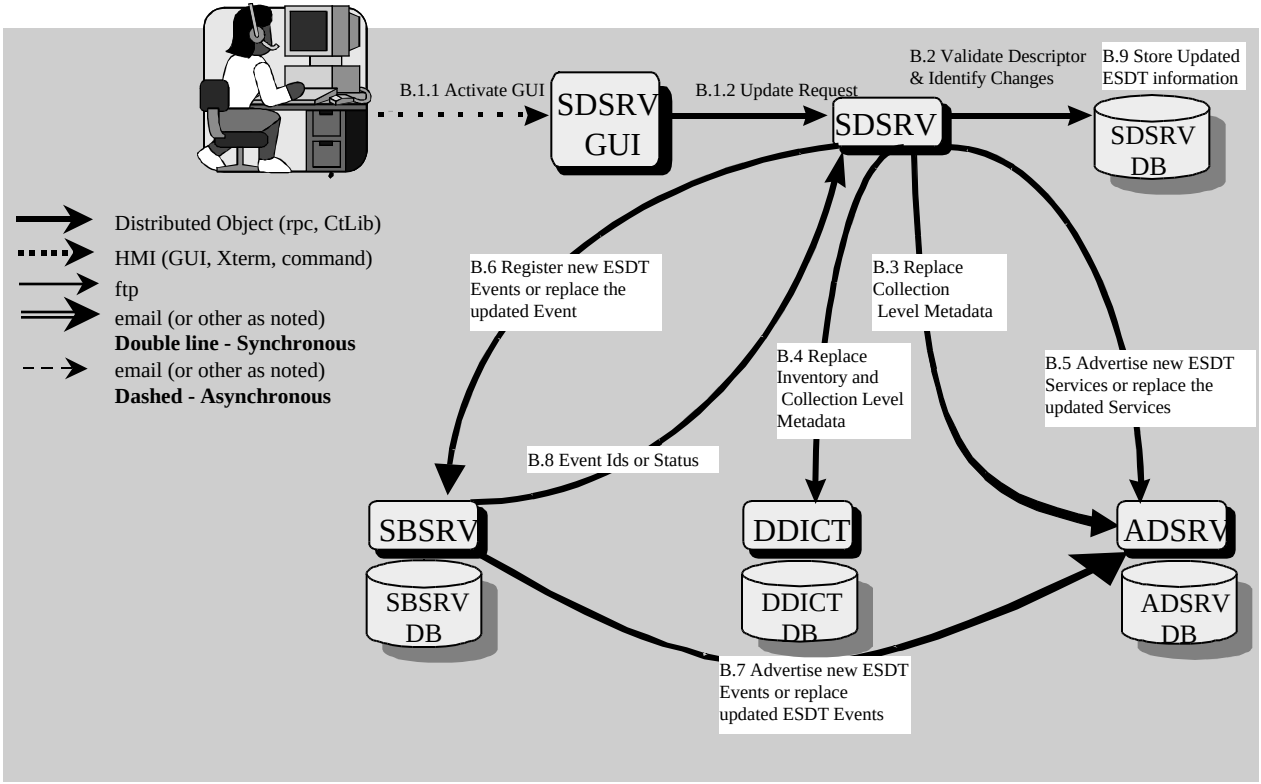


None

Modifications

- **Science Data Server - New Update ESDT Interface**
- **Subscription Server - New Interface to add qualifiers to registered events**
- **Advertising Server - New interface to insert/update services**

Update ESDT Interaction Diagram



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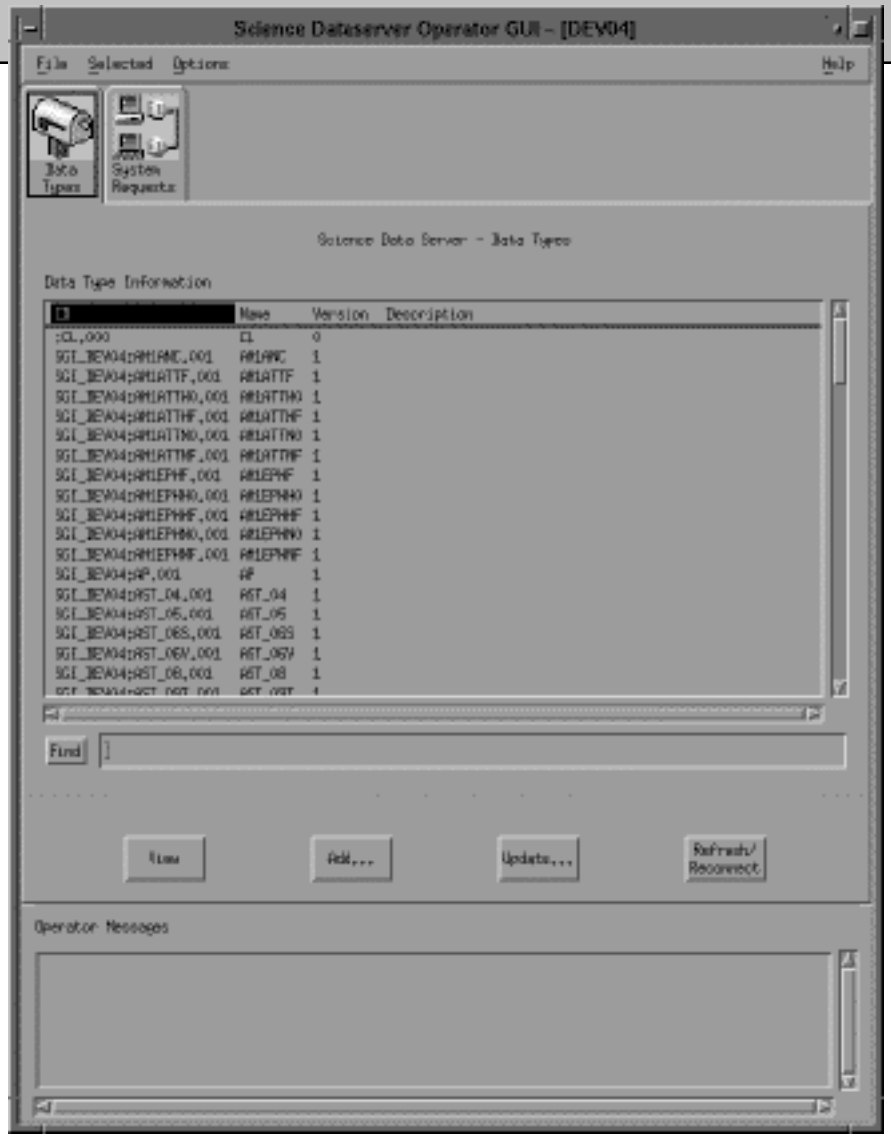
SDSRV Gui Main Screen

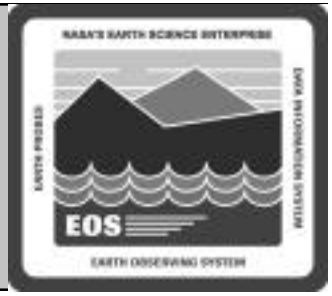


Modified Screen

SDSRV Gui Update ESDT Screen

New Screen

Operational Impacts



- **It is possible to update a descriptor without creating a new version of the ESDT.**
- **Have to start SDSRV in “maintenance” mode to update ESDTs.**
- **ESDTs that are not updated successfully are marked unusable until fixed.**